Pulsar mystery ends: The TV camera did it

Oops! Forget that dramatic report last year of a rapidly spinning pulsar at the heart of supernova 1987A – the fastest pulsar ever described. "It was a television signal," says John Middleditch of the Los Alamos (N.M.) National Laboratory.

Middleditch, a member of the team that reported discovering the pulsar rotating 1,968 times a second (SN: 2/18/89, p.100), retracted the finding in New Orleans this week at the American Association for the Advancement of Science meeting. Many researchers studying the supernova had been notified of the embarrassing development a few days before.

"We didn't expect a television camera to be this coherent, but it was," Middleditch says. "You can't tell the difference between this [signal] and a pulsar."

Since supernova 1987A temporarily brightened the Southern Hemisphere's night sky three years ago, astronomers have expected eventually to find a pulsar there – a dense, spinning sphere of neutrons left after the cataclysmic collapse of a large star. On Jan. 18, 1989, astronomers recording the supernova's visible and infrared light at the Cerro Tololo Inter-American Observatory in Chile got nearly seven hours' worth of data. The observations seemed to reveal pulsations about 0.5 milliseconds apart, with variations in the pulsar's spin frequency that suggested the presence of an orbiting companion with the mass of Jupiter, and perhaps a second companion with the mass of Neptune.

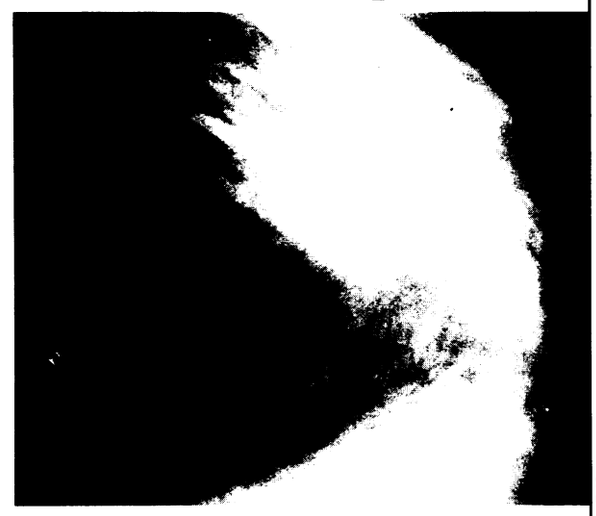
No one ever confirmed the pulsar sighting. Theorists offered suggestions for why the pulsar might have appeared and then disappeared from view, as well as models for its composition (perhaps pure quarks) and why it rotated so rapidly.

Then, on Feb. 8 of this year, as the team prepared for new observations of supernova 1987A, they pointed the Cerro Tololo telescope at the Crab nebula, site of a well-studied pulsar, and recorded the identical pulse rate reported for supernova's pulsar. "So obviously the universe is pulsed or the signal has nothing to do with the pulsar," Middleditch says.

He says the spurious signal apparently came from one of two television cameras used to help guide the telescope. It appears, Middleditch adds, that the camera was used on Jan. 18, 1989, but not for subsequent looks at supernova 1987A until this month. "We're not absolutely sure if it is the TV camera alone or the camera and the electronics that guide the telescope," he says.

The search for the telltale pulses continues. Says Mark M. Phillips of the Cerro Tololo staff: "We still think a neutron star is in there." – *P. Young*

Venus gives Galileo a boost in space



JPL

The Galileo spacecraft took this photo of Venus on Feb. 12 from slightly more than 1.6 million kilometers away, as it swung around the planet to accelerate toward a 1995 encounter with Jupiter. An atmospheric circulation feature shaped like a sideways "V," familiar from past Venus observations, crosses the surface-masking clouds. The image also shows atmospheric wave patterns and convective clouds, revealing details as small as 40 km across. The ring-like features are blemishes, possibly due to dust in the optical system, and will be removed later by computer processing. The Venus swing-around, which NASA added to the mission's planned trajectory after deciding to use a smaller booster rocket to begin the trip, increased Galileo's speed by more than 8,000 km per hour, to about 134,000 kph. An Earth flyby in December will add another 25,000 kph, followed two years later by a 12,000-kph boost when the craft comes around for a second Earth maneuver that will fine-tune the course for Jupiter.

Acid assessment: The state of the science

Only 10 years ago, respected researchers contended that "there is no reason to state that pollutants in modern time are the chief reason for the acidification of surface waters," recalls Patricia M. Irving, associate director of the National Acid Precipitation Assessment Program (NAPAP). Since then, NAPAP has gathered ample evidence to the contrary. In a mammoth draft report unveiled last week, this $500 million federal program – one of the largest research efforts in history – concludes that the sulfur- and nitrogen-based air pollutants emitted during fossil-fuel combustion are indeed responsible for most of the acidification plaguing sensitive lakes and streams in the eastern United States.

While refuting those who once downplayed the problem, the new study also contradicts the doomsayers of a decade ago who predicted widespread collapse of aquatic and terrestrial ecosystems under assault from acid rain. NAPAP reports that only about 4 percent of the lakes sampled in the National Surface Water Survey – the largest analysis to date of vulnerable U.S. waters – are acidic. In addition, the authors conclude that ambient levels of acidic precipitation in the United States are "not responsible for regional crop yield reductions" or for damage to "the vast majority" of North American forests.

NAPAP has "changed the way the world thinks about acid rain," says Michael R. Deland, chairman of the President's Council on Environmental Quality, which administers the interagency research program.

In 1980, President Carter created NAPAP as a 10-year program to study not only the causes and effects of acid deposition but also the best strategies for controlling it (SN: 2/16/80, p.106). At an international NAPAP meeting in Hilton Head Island, S.C., last week, more than 600 scientists shared new findings and debated how well the draft report – entitled "State of Science and State of Technology" and spanning more than 15,000 pages – sums up what NAPAP scientists have learned.

Each book in the 28-volume series was anonymously peer-reviewed by at least three scientists before the meeting and by an identified reviewer at the conference. In general, critics deemed the study comprehensive and reasonably balanced. However, most also noted data gaps that leave several important questions unanswered. Among those questions: Which chemical constituents, whether in rain, snow, fog or dry particulates, have the greatest effect on the health of humans and other species? Which of the many new computer models of toxicology described in the report (and showcased for the first time at last week's meeting) best predict the effects of acids on aquatic species? And to what extent do brief but acute acidic episodes

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